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RELATIONSHIP BETWEEN TYPE Pc1-OSCILLATIONS AND MAGNETIC STORMS

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SUMMARY

The relationship between type-Pc1 oscillations and magnetic storms are discussed in the light of the character of the former and by investigating their full spectrum of frequencies of appearance, namely the tendency to a shift of the time of pearl appearance in the course of 24-hour storm days.

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In order to ascertain the nature of sources of type-Pc1 oscillations their relationship with magnetic storms is of particular interest. It was shown in [1] that from the standpoint of duration the greatest number of oscillations of the "pearl" type appear on the 3rd to 7 th day after storm. This result was obtained for 25 isolated geomagnetic storms for the period 1961-1963.

Analogous investigation is conducted in the present work according to data of st. Borok and Sogra with a modified method of storm sorting. Eight isolated geomagnetic storms were picked, which were observed against the background of the quietest magnetic field in the years of minimum and of accretion of magnetic activity (1964-1966). This allowed us to consider the sorted storms as isolated with a greater foundation than in the work [1]. A steep front is characteristic of the storms considered, that is a sharp increase of the K_p-index at time of the storm by comparison with its preceding value. Considered isolated was the storm with a preceding and subsequent quiet field, i. e. 10 days prior and after the storm the mean daily value of $K_p \leqslant 30$. A day of a storm is that when the 24-hour sum of 3-hour K indices $\Sigma K_p \geqslant 30$. Following are respectively the zero days for the selected 8 storms: 4 March, 1 April, 10 May, 7 September 1964; 18 April, 16 July, 16 September 1965; 14 March 1966. For the storm of 14 March 1966, in which the "isolation interval" was narrower than in the remaining ones, we examined 10 days prior and 7 days after the storm. Inasmuch as in the work [1] the distribution of Pc1 was obtained for the law-latitude station Palo Alto (California), i. e. basically for pearss with $T \leqslant 2$ sec [2], pearls of identical periods were considered in the present work.

(*) SVYAZ' KOLEBANIY TIPA Pc1 MAGNITNYMI BURYAMI

Comparison of the behavior of Pc1-oscillations after the storm at a few stations must be conducted for pearls with $T \leqslant 2$ sec, taking into account the waveguide character of propagation of such frequencies [3]. The obtained distribution of Pc1-oscillations in the days preceding and following the stormy day is shown for st. Borok in the graph of Fig.1 with a table of K_p-indices for all the eight storms. The numbers of storms are shown to the right. In the upper row the distribution of K_p-indices is shown from day to day,

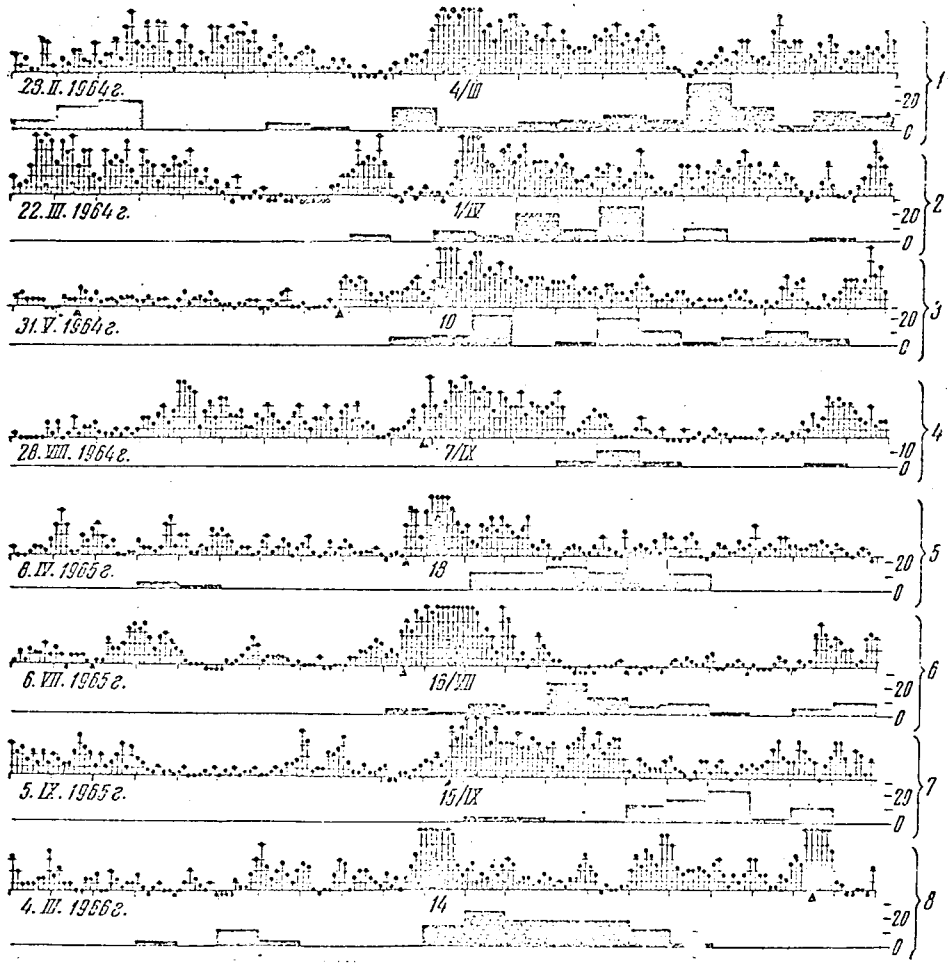

Fig.1

and in the lower row – the number of 15-minute intervals of Pc1-oscillations' appearance for each day. The data obtained fundamentally corroborate the conclusion of work [1]. Indeed, from the standpoint of duration the greatest number of type-Pc1 oscillations correspond to the 1–7th day after the storm. The maximumof Pc1 appearance corresponds to the 3rd–4th day after the zero day.

Therefore, the character of Pc1-oscillations' link with the universal magnetic storms allows us to draw the conclusion that conditions are created in the course of storm development in the magnetosphere, which are favorable for excitation of Pc1 oscillations. The events, contributing to Pc1 generation

amount apparently to the following:

1) remnants of magnetic storms' ring current influence the generation of Pc1;
2) the relaxation phenomenon of radiation zones after a geomagnetic storm is responsible for the generation of Pc1-oscillations;
3) it is possible that the most favorable conditions for the excitation of Pc1 are created beyond the limits of the magnetosphere after the storm.

Investigation of the full spectrum of frequencies of Pc1-oscillations was also conducted. A tendency was revealed to a shift of the most typical time of pearl appearance in the course of 24-hours of magnetoperturbed days.

For mid-latitude stations (Borok) the most favorable time of the day for passage or generation of pearls are the morning hours, about 5 to 7 a.m. L.T. In the day of the storm this maximum shifts to 12 −13 hours L.T., and in the subsequent days it moves to still later hours: to 1800 hours local time in the first day of the storm, to 2300 hours local time on the second day of the storm. In the subsequent days the maximum of pearl appearance corresponds, as in the quiet days, to morning hours (0500 − 0700 hours local time).

Such a pearl appearance may be explained by a hypothetical zone of maximum recurrence of pearls. The fact of time shift of Pc1-oscillation appearance during a storm can be explained by the shift to that zone to lower latitude during geomagnetoactive days.

It is also revealed that in the course of the storm the prevailing pearl period for a day varies. A tendency is observed to decrease (from 3 −4 to 1 −1.5 sec) and a subsequent rise of pearl period in the course of the storm. This result is not in contradiction with the representations that the variation of magnetosphere properties during a storm are reflected in the frequency of pearl excitation. Therefore, magnetic storms are attended by sharp increase of type Pc1-oscillations, whose behavior during the storm differs also from the behavior of pearls in a quiet unperturbed magnetosphere.

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**** THE END ****

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